OHIO STATE UNIVERSITY

Comparison of depressive symptoms and overweight/obesity in high school students

Thesis

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Abstract

Obesity is a growing epidemic in America, reaching record levels of 25% or more in 30 states, and attributing to over 300,000 deaths each year. The most recent data from the Center for Disease Control (CDC) reveals that approximately 1 in 5 teens is overweight, and 80% of obese teens will continue to be obese adults. Recent studies have revealed a correlation between depression and obesity, and possible implications of mental health and self-esteem influencing the persistence of obesity in adolescence. However, much of the current research pertaining to obesity and depression is conflicting as to the etiology, order of causation, and strength of correlation. Therefore, this study examined linkages between the two conditions in order to best address means of intervention and treatment. The methods involved a retrospective cross-sectional analysis of 2009 Youth Risk Behavior Survey (YRBS) data, retrieved from the CDC website. SPSS 19.0 was utilized to analyze complex samples. Results of the study indicate higher incidence of depressive symptoms and depression in overweight and obese teens ($p<.05$). Further, significantly higher incidence of severe depression were present within female obese teens as compared to obese male counterparts and obese teens within the 12^{th} grade as compared to 9^{th} grade cohort. Findings supported research that positively linked depression and obesity in adolescents. Additionally, the data supported research that states obesity correlates to decreases in self-esteem and increases in severity of depression, as seen through increases in severe depression within older (12^{th} grade) teens. Results of the study may help to target at risk adolescent populations and support the addition of a psycho-social component that addresses self-esteem and social skills within adolescent obesity prevention and treatment programs.

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Chapter 1

INTRODUCTION

Problem:

Obesity is a growing epidemic in America with over 30 states reaching an obesity rate of 25% or greater (cdc.gov). Each year obesity is attributed as the causative factor in over 300,000 deaths (Mokhad, Serdula, & Dietz, 1999). Obesity is defined as having a BMI greater than 30, as based on height and weight estimates. Individuals who are obese have an increased risk for developing "diseases of laziness": including cardiovascular diseases, certain types of cancers, hypertension, hyperlipidemia, sleep apnea, and diabetes mellitus (cdc.gov). Direct and indirect costs of obesity equal 48 billion dollars per annum and continue to increase. The most recent data from the CDC reveals that 12% of American adolescents are obese, and around 1 in 5 teens is overweight. Adolescents who suffer from obesity have an 80% risk of continued obesity throughout their adult lives. This continuance proves evident as the largest increases in obesity are seen within the population of 18-29 year-olds (Mokhad et al, 1999). Knowledge of the causes and contributors of obesity allow for creation of more complete and targeted programs to prevent obesity and its persistence.

Problem Statement:

Because of the increase in the number of obese adolescents, and the 80% chance of adolescent obesity continuing into adulthood, it is important to have better understanding of comorbidities and factors attributed to obesity. Recent studies have revealed a correlation between depression and obesity, and possible implications of mental health and self-esteem influencing the persistence of obesity in adolescence.

Much of the current research pertaining to obesity and depression is conflicting as to the etiology, order of causation, and strength of correlation; therefore, it is important to more closely examine linkages between the two conditions in order to best address methods of intervention and treatment.

Related Research:

Self-esteem/self worth is the way an individual views himself/herself; in adolescence, self-esteem is best predicted by an individual's view of his/her physical appearance and social acceptance (Kutob et al, 2002). Obese teens are often the subject of teasing from their peers, which according to a 2002 study by Kutob et al is not necessarily indicative of depression, but is found to contribute to social isolation, anxiety, depressive symptoms, and even physical duress, including headaches and stomach pain. The Kutob et al (2002) study was an ethnically diverse 4-year longitudinal survey of 4th and 5th graders in Arizona and California. Participants received yearly written and physical measures of height/weight and self-esteem (including self reports of bullying/ teasing); self-esteem was measured through a modified version of the McKnight Risk Factor Survey IV. The study found that peer teasing from both genders (being teased by boys/ being teased by girls) is detrimental to either gendered subject, and is considered the number one predictor of low self- esteem in adolescents (Kutob et al, 2002) This is significant because how an individual determines his/her view of self is largely based on body weight, as such obese and overweight teens are more prone to negative self-image and have a higher prevalence of mental disorders, including depression.

Although many studies support the link between obesity in teens and low self-esteem/ higher rates of depression, a few studies question the existence of a relationship.

Cook and Wardle (2005) performed a comprehensive study, citing that the rates of depression in obese adolescents were reported higher in past studies because of the clinical nature of the trials utilized (those seeking treatment were not true representative sample because they were openly seeking treatment) and correlations are therefore, "negligible at best". The researchers further noted that self-esteem measures are also ineffective as past studies were not taken from a global stand point --whether or not the adolescent liked themselves overall-- rather measures equated self-esteem with whether an individual liked his/her body (Cooke and Wardle, 2004). A study by Boutelle et al (2010) also did not find strong correlates between obesity and depression. The 2010 study revealed increases in depression markers within obese teens, but the researchers attributed the phenomena to the stigma of being obese, rather than having an increased BMI (Cook and Wardle, 2010).

In contrast, a 2002 longitudinal cohort study by Goodman and Whitaker showed the increased likelihood of obesity in baseline depressed teens, with 12.4% of depressed individuals at baseline presenting with obesity at follow-up compared to 9.4% who were not obese at baseline. Whitaker and Goodman suggest that depression not only increases the likelihood of adolescents becoming obese as adults, but also increases the severity of obesity in already obese adolescents. The effects of depression and low self-esteem in overweight and obese children were indistinguishable, but self-esteem was found to decrease with each year of subsequent obesity (Whitaker and Goodman, 2002). Vila et al (2004) suggest that the lack of findings by Cooke and Wardle (2004) was due to the fact that adolescents have not experienced the failure of unsuccessful weight loss, and teens

are more capable in their ability to adapt personally and socially than their adult counterparts.

The effects of low body satisfaction are not limited to obese and overweight adolescents; the1998 Kostanski and Gullone study (as cited in Felton et al, 2010) found that 80% of adolescent females and 29% of adolescent males expressed a desire for an ideal self 2 clothing sizes smaller than their actual size. The overwhelming amount of body dissatisfaction contributes to the high rate of adolescent dieters; a 1999 Paxton study (as cited by Felton et al, 2010) states at any given time 60% of adolescent females and 10% of adolescent males are on a diet. Unfortunately, dieting in adolescents is often predictive of disordered eating (anorexia, bulimia, binge eating, and obesity) and more frequently weight gain rather than weight loss (Stice et al, 1999). In her 2010 study, Felton tried to determine the relation between depression and weight change in adolescents. Participants in the study were from a small southern town and ranged from 6^{th} to the 12^{th} grades. Students were followed for a four month period with baseline measures at the beginning and end of the four month period, and were administered the Children's Depressive Inventory to determine depressive symptoms. Distinctions between the depression markers of weight gain/loss and appetite increases/decreases were made. A significant correlation was found between increases in depression markers and fat gain in females ($p<.018$). Self- reported depressive symptoms were consistently related to, "less healthy eating behaviors and worse body image" (Felton, 2010).

Variances in levels of depression are often attributed to the gender and severity of obesity of the individual. Females experience higher rates of depression, with adult gender differences evident between13-15 years of age (Boutelle et al, 2009). Nolen-

Hoeksema, Grayson, and Larson in 1999 (as cited in Boutelle et al, 2009) theorized that the discrepancies in female depression rates are due to the fact that females, "experience… chronic strain and psychological factors, such as rumination." Further, popularity for females is often based on physical appearance, and increases in weight can cause decreases in self worth. In males, while prevalence of depression is lower, the severity is more likely to be more intense. In the study by Wardle and Cooke (2004) obese, depressed males were found to report more depression markers than their female cohort, with marked increases with each subsequent year of obesity. Differences in depression prevalence also varies with increased BMI; according to Vila et al 2004, super obese teens, BMI >35, were less likely to be depressed due to a sustained condition of being overweight, and have adopted, "a fatalistic approach to the large amount of weight they have to lose."

In conclusion, it is unclear if weight gain or the stigma of weight gain is what causes depression, or if depression is a cause or side effect of obesity. There is a consensus that adolescents who suffer from obesity score lower in social and activities scores than their normal weight peers (Vila et al, 2004). Overall, it seems that the cycle of weight gain and mood is vicious, whether or not it is the lack of social skills common in obese teens that leads them to social isolation and depressed mood, or it is the depression from poor social relations that causes teens to have increased appetite and low self-esteem attributed with developing obesity. Either way, treatment of obesity in adolescents needs to include a emotional/ mental wellness component along with possible social skill workshops to increase self-esteem in subjects. Further research should be performed to determine other factors which may contribute to psychological disorders in

adolescents and effective methods of increasing self-esteem along with healthy behavioral practices.

The Social Cognitive Theory (SCT) will be used in this study as a basis to evaluate the related research and future acquired data. The SCT is effective in explaining how people acquire and maintain certain behavioral patterns, and how beliefs of personal ability (self-efficacy) affect behavior. SCT also takes into account the individuals perception of their circumstances along with self-efficacy as influences of behavior. Knowing more of the causative factors of obesity and depression will give a more complete incite into effective intervention strategies.

Objectives:

The objectives of the study were to determine the relationship between weight and depression in adolescence. A further look at the link between obesity and depression in adolescents was made using YRBS data, and differences in depression prevalence in younger and older adolescents along with male and female prevalence rates will also be gleaned. A comparison of depressed mood and severe depression differences in male and female and younger and older obese adolescents were examined. Looking at factors that can contribute to both obesity and depression can help health professionals target at risk populations and determine the best methodology for treatment. The specific research questions of this study were as follows:

1. Do obese teens have more depressive symptoms than non-obese teens?
    a. Do obese teens report feelings sadness or hopelessness for more than two weeks more often than non-obese teens?

   b. Do male obese teens report feelings of sadness or hopelessness for more than two weeks more often than female obese teens?
   c. Do younger teens report feelings of sadness or hopelessness for more than two weeks more often than older teens?

2. Do obese teens have higher occurrences of severe depression than non- obese teens?
   a. Are obese teens more likely to have considered or planned a suicide attempt than non-obese teens?
   b. Are male obese teens more likely to have considered or planned a suicide attempt than obese female teens?
   c. Are younger obese teens more likely to have considered or planned a suicide attempt than older obese teens?

Chapter 2

METHODOLOGY

Population and Sample:

Data was retrieved from 2009 Youth Risk Behavior Survey (YRBS). YRBS is part of the Center for Disease Control's Youth Risk Surveillance System; the population of the sample is high school students from around the nation consisting of diverse ethnic, cultural, economic, and educational backgrounds. The sample data is weighted and stratified to be representative of American students in grades 9 through 12. The population only includes those who chose to participate in YRBS, and also received parental consent. Because analysis was performed utilizing a secondary database no IRB consent was necessary.

Design:

The study is a retrospective cross-sectional design and data was downloaded from the CDC's website. The Statistical Package for Social Sciences (SPSS 19.0) was utilized to analyze complex samples

Instrumentation and Data Analysis:

The data files used in the study come from 2009 Youth Risk Behavior Survey administered to high school students in the US. The validity of YRBS instrument self-report data is congruous with other similar, accepted data. The testing of anthropometric data may indicate slight overestimates of height and underestimates of weight; this discrepancy in data may cause slightly lower calculated BMI's and therefore decreased rates of obesity in the sample. Despite slight under-representation of BMI, YRBS instrument questions indicate high test- retest reliability.

The following responses, as retrieved from YRBS data files, will be reviewed and utilized for analysis:

(Q1) How old are you?

(Q2) What is your sex?

(Q6) How tall are you without shoes on?

(Q7) How much do you weigh without your shoes on?

(Q23) During the past 12 months, did you ever feel so sad or hopeless almost every day for two weeks or more in a row that you stopped doing some usual activities?

(Q24) During the past 12 months, did you ever seriously consider attempting suicide?

(Q25) During the past 12 months, did you make a plan about how you would attempt suicide?

The results of questions 6 and 7 were used to calculate BMI. Data from question 23 were used to determine depressed mood, and positive responses on questions 24 and 25 were utilized to indicate a more severe form of depression. Questions 1 and 2 were used to determine if gender and age (younger vs. older teen) differences are apparent in the presentation of depressed moods and more severe depression in obese youth.

Chapter 3

RESULTS

Sample Population Description:

The sample population included the results from 16,410 American high-school students, ranging from 14 to 19 years of age. Males compose 52.2% of the sample with 8537 students, and females composed 47.8% of the sample, with 7,816 students.

Students involved in the survey were asked to identify as Hispanic or non-Hispanic. The subsequent question then required students to chose as many as applicable from the following list: American Indian/ Native Alaskan, Asian, Black or African American, Native Hawaiian/ other Pacific Islander, or White. Within the context of the research, Hispanic and Multiple-Hispanic were combined into a singular "Hispanic" grouping; American Indian/ Alaskan Native, Asian, Multiple-Non-Hispanic, and Native Hawaiian/ other Pacific Islanders were combined to form an "Other" grouping, and both White and Black or African American will remain unmodified.

The demographic of the sample is reflective of actual national averages, with minor oversampling in minority groups to insure representation. Whites composed 58.7% of the sample, 9452 students; the combined "Hispanic" grouping composed the nearly a 1/5 of the sample, with 18.6%, 2989 students. 2320 students identified as Black or African American, composing 14.4%, and 1349 students identified as other, 8.4%.

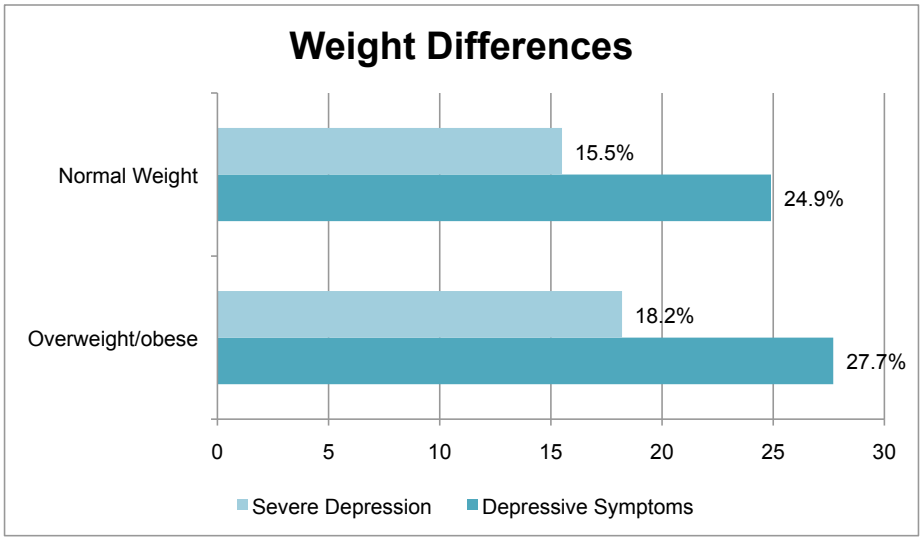
The Freshman cohort consisted of 4570 individuals, while the 12th grade cohort consisted of 3628 students. Although the 12th grade sample was smaller and contained a larger white population, 58.4% compared to the 49.4% within the freshman population, the data was still comparable due to the large size of the samples. The decrease in population between the 9th grade and 12th grade is most likely due to attrition. US minority groups have a higher prevalence of drop out rates, with the greatest decreases seen in the Black and Hispanic populations.

Data Analysis:

BMI measures derived from response to "How tall are you without shoes on" and "How much do you weigh without your shoes on". BMI interpretation for children and adolescents is age and sex specific and is based off the percents of the 2000 CDC growth chart (Flegal and Ogden, 2010). In 1994, a federally convened committee of experts recommended that BMI's that fell between the 85th and 95th percentile are to be classified as overweight, and readings at the 95th percentile and above are considered obese (Flegal and Ogden, 2010). The committee defined overweight as bearing excess weight compared to the standard, and obese as having excess body fat (Flegal and Ogden, 2010). Measures were mirrored within the study, as individuals whose BMI were >15% and <85% for their age and gender were categorized as normal weight (NW). Individuals whose BMI were >85% for their age and gender were categorized as overweight (OW)/ obese. A yes response to, "During the past 12 months, did you ever seriously consider attempting suicide?" and/or "During the past 12 months, did you make a plan about how you would attempt suicide?" was considered evidence of severe depression. A yes response to,

"During the past 12 months, did you ever feel so sad or hopeless almost every day for two weeks or more in a row that you stopped doing some usual activities?" was considered evidence of depressive symptoms. To maintain consistency, valid percents, rather than actual percents, were used. Chi Square analyses were performed to assess differences in the prevalence of depressive symptoms and severe depression

Results:

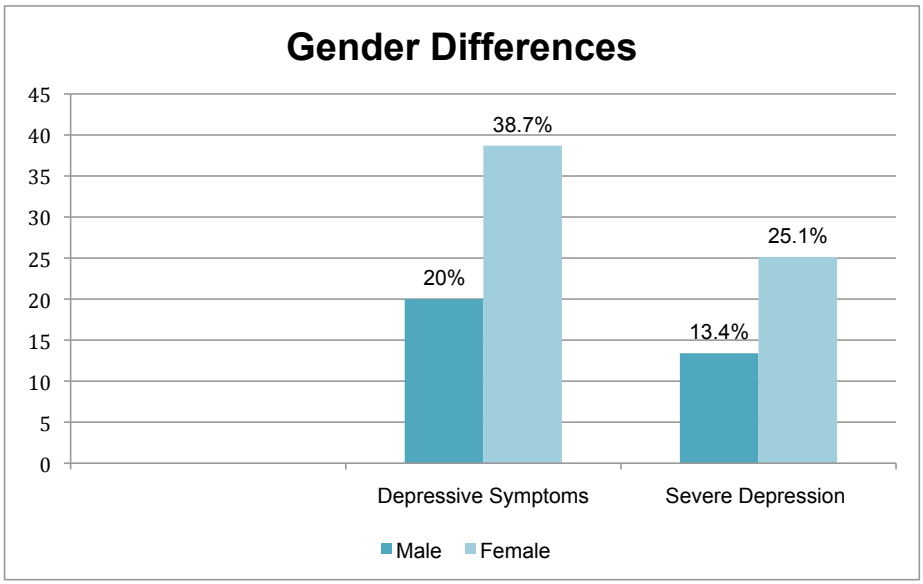


Depressive Symptoms

Rates of depressive symptoms were higher within overweight and obese students in comparison to their normal weight cohort ($p<.001$). 1,198 of 4330 OW/obese students responded yes to feeling depressive symptoms, or 27.7%. Normal weight peers reported depressive symptoms 24.9% of the time, with 2614 of 10,505 students reporting depressive symptoms.

Severe Depression

Analyses of severe depression also found significantly higher rates in overweight and obese teens as indicated by a yes response to either seriously considering or making a suicide plan within the last 12 months (p<.000). 785 of 4,314 OW/obese teens reported severe depression, 18.2%. Within the NW category 1,626 of 10,496, 15.5%, responded positively to severe depression markers.

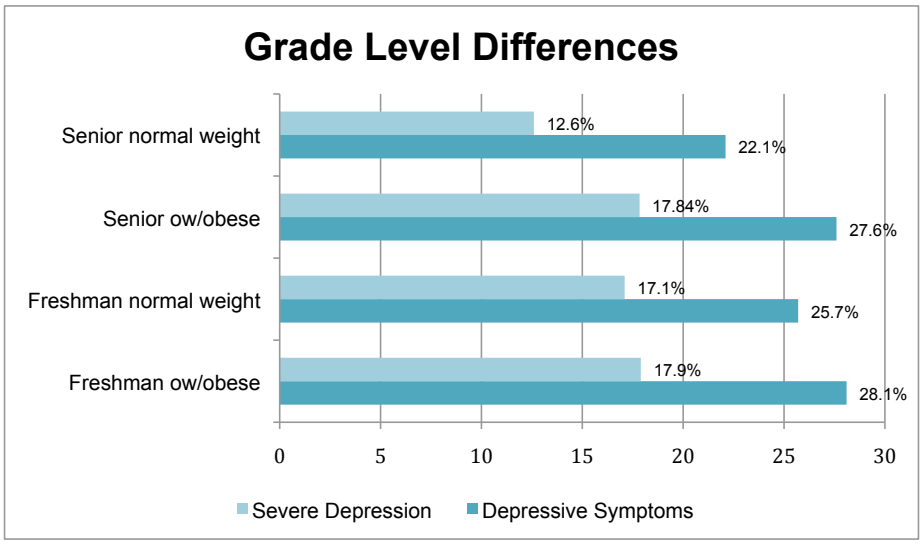


Depressive Symptoms

While the proportion of obese males is greater than obese females, 2550 males vs. 1780 females, females were almost twice as likely to report depressive symptoms (p<.001). 20% of overweight and obese males responded yes to feeling sad or hopeless for 2 weeks within the last 12 months, with 510 of 2,550 students. 38.7% of overweight and obese females reported depressive symptoms, with 688 of 1,780 students.

Severe Depression

A quarter of OW/obese females responded yes to seriously considering/ planning suicide within the last 12 months compared to 13.4% of male students. Chi Square analysis showed statistical significance in the correlation of gender difference and severe depression in OW/obese cohort (p<.000).



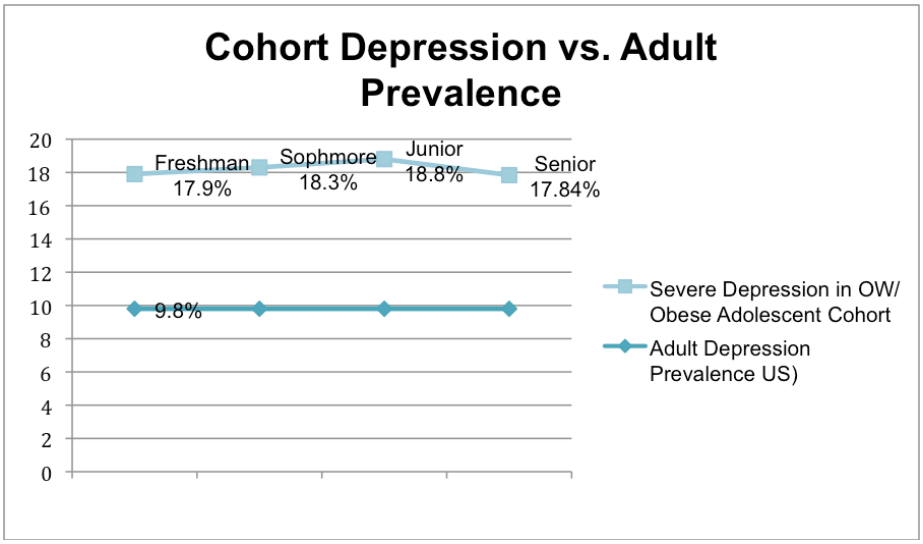
Depressive Symptoms

Rates of depressive symptoms are higher in OW/obese teens than their NW counterparts. Depressive symptoms within the freshman cohort, signified by whether or not the teen had been sad two weeks in the past 12 months, was 25.7% in the NW population, and 28.1% in the OW/Obese population. The Chi Square analysis within the 9th grade was not statistically significant (p>.062). However, the results within the 12th grade student were statistically significant with a Chi Square

analysis (p< .0001). Within the 12th grade population 22.1% of NW students reported depressive symptoms, compared to their OW/obese counterparts 27.6%.

Severe Depression

The freshman population reported severe depression, marked by a yes response on either seriously considering/planning suicide within the last 12 months, in 17.1% of the NW population and 17.9% in the OW/obese population. The 12th graders within the NW category responded significantly less often than the OW/obese population, 12.6% verse 17.84%. Chi Square analysis showed statistical significance in the comparison of age difference and severe depression (p<.028).



A steady increase in severe depression is evident within the adolescent obese cohort, with a peak within the 11th grade. 10th graders had a severe depression rate of 18.3% within the OW/obese cohort. 11th graders had a severe depression rate of 18.8% within the OW/obese population. The adult prevalence of depression is 1 in

10 (cdc.gov). Although the 12th grade cohort includes individuals between the ages of 17 and 19 (adults and those approaching adulthood), the rate of severe depression within the OW/obese cohort does not mirror the adult prevalence. The rate within the NW 12th grade cohort, 12.84%, begins to approach the adult depression prevalence, but when averaging the entire 12th grade cohort (NW and OW/obese) depression rates continue to greatly exceed 9.8%.

Discussion

The results of the analysis show a higher rate of both depressive symptoms and depression within the overweight and obese populations. This finding is consistent with the study by Kutob et al (2002) that related a link between low self-esteem and increased depressive symptoms with lower body satisfaction and higher BMI. Those researchers attributed decreases in self-esteem to be due to teasing from both gendered peers. While teasing may be the reason for decreased self-esteem, individuals within this study are older than the 4th and 5th graders participating with Kutob et al's (2000) study. It may be likely that teasing has given way to greater peer pressure and the desire to be accepted/popular. Boutelle et al (2010) expanded on the idea of social norms and self-worth and hypothesized that the stigma of the condition of being obese itself, not BMI, was correlated with depression and depression markers. This may also be true, as teens have greater self-awareness, and feel the stigma of obesity at a higher intensity due to pressures of peer acceptance. Changes in the brain, beginning at about age 12 lead to increased use of the amygdala during adolescence due to incomplete synaptic pruning (Teenage Brain: A Work in Progress, n.d.) Because of the increased activation of the

amygdala during adolescence, teens are more likely to misinterpret the emotions of others and experience decreased rational decision-making (Teenage Brain: A Work in Progress, n.d.). Incorrect interpretation of peer emotion and lack of rationality may be a contributor to the decreased self-esteem measures and feelings of acceptance within the analysis.

Findings of the analysis did not support the 2004 study by Cook and Wardle, which denied the relationship of depression and OW/obesity. Findings of their study speculated that the narrow definition of self-worth/esteem and the clinical nature of the prior trials lead to over-reporting, as OW/obese teens seeking help are different than their other OW/obese peers (Cook and Wardle, 2004). Despite the voluntary nature of the YRBS, the large sample size should overcome the errors due to the clinical setting, as students were not required to make special accommodations to participate in the survey. YRBS data did not address measures of self-esteem directly; however, questions of depression and depressive symptoms ask about feeling sad or hopeless/ considering suicide/ or planning suicide within the last 12-months. Long-term affect readings are more likely to provide global views of self and emotional status, rather than the problematic views of self mentioned by the researchers (Cook and Wardle, 2004).

Whitaker and Goodman (2002) disagreed with obesity leading to increased depressive symptoms, holding to the opposite position of depression leading to obesity. Their 2002 study indicated depression as the causal factor, increasing the likelihood of obesity and the severity of obesity in already overweight and obese individuals. Further, each subsequent year of depression lead to decreases in self-

esteem. According to their findings, seniors should have higher prevalence of OW/obesity and depressive symptoms/ depression. This was not found to be the case within the data analysis. The discrepancy is likely due to attrition within the senior population. Minorities have higher prevalence of OW/obesity, and there was a decreased prevalence within the senior population of minority youth, possibly leading to lower prevalence of obesity and overweight in the 12th graders. Also teens that dropout of high school are more at risk, and are likely to have depressive symptoms/depression, leading to decreased findings. The gaps between severe depression in the 12th graders and the normal weight cohort were found to be statistically significant.

According to Boutelle et al (2010), females are more likely to contract depression due to rumination and the association between popularity in females and physique, with adult depression rates visible by the early high school years. This finding was supported by the analysis. Males out numbered females, but females were nearly twice as likely to report depressive symptoms and severe depression. Male adolescents are not judged as harshly for physical appearance; rather, possession of a larger frame may be viewed as a positive athletic attribute. Bouttelle et al (2010) also found that although men were less likely to report depression, the intensity of reported cases was more severe (greater number of depressive markers). However, no gauging of intensity beyond depressive symptoms and depression were performed in this analysis.

Implications:

Knowing that increased body mass percentage is linked with depression provides evidence for the using obesity prevention programs with psycho-social components. By stressing a global self-worth rather than an opinion based on self-image participants can learn to appreciate positive aspects of self, rather than focusing on negative body image affect. Addition of peer-modeling and interaction could increase self-efficacy during social interactions and lead to increased self-confidence and worth contributing to improved health outcomes.

Second, knowing the high prevalence of depression and depressive symptoms in the young cohort gives evidence for mandating earlier health curriculum interventions. Kutob et al (2002) saw evidence of low self-esteem affecting weight in grades 4 and 5. By beginning an obesity prevention and wellness program in the elementary and middle school years, youths may feel may feel more socially adept and better equipped to deal with the peer pressure that has been linked with increased weight gain.

Third, as females had statistically significantly higher correlates of depressive symptoms and depression, programs targeted specifically at female youths are needed. Although it is impossible to change the social constructs of ideal body image or prevent girls from comparing themselves to those images, some sheltering may occur. If girls are specifically targeted for interventions and screened for depression, action may more readily be taken to teach appropriate stress reduction tactics and related eating habits. Intervention at an early age could also prevent rumination, which has been associated with binge eating and depressive symptoms. A study by Nolen-Hoeksema et al (2008) found that rumination can be negatively reinforced

through constant use, but this finding has implications for intervention. Rumination has proven to be decreased through writing techniques and mindfulness exercises, both cost effective interventions (Nolen-Hoeksema et al, 2008)

A final implication of the study is the higher prevalence of depressive symptoms and depression in both age cohorts. While adult prevalence of depression may be under reported, both the freshman OW/obese cohort and the senior OW/obese cohort occurrence of severe depression exceeded the 1 in 10 prevalence (cdc.gov). Further, examination of sophomore and junior cohorts show higher rates in OW/obese adolescents than the NW cohort and the adult depression prevalence. Higher rates of depression may be to due to the incomplete development of the adolescent limbic system, but it may also be attributed to the stress of transitioning and social change. The survey was taken between February and May of 2009; Juniors may be feeling pressure of beginning to take steps towards future plans, college, vocations, etc…

Limitations:

The majority of limitations of the analysis were a result of the secondary nature of the data. Due to information gleaning from a secondary source, depression markers, causality, and long term data for the cohorts are impossible to determine. Verification of men having decreased prevalence but more severe depression markers cannot be determined beyond that rate of depressive symptoms and depression were much higher in females. Order of causation of depression and obesity cannot be ascertained, only the existence of a relationship. Further, longitudinal studies of adolescents would be necessary to determine if obesity or

depression was the initial causative agent.

Additional limitations attributed the design is the lack of information available for students who had left high school. Current high school drop out rates within the US are 30% with higher instances in minority youth (High School Drop Outs in America: Fact Sheet, 2009). Little over 50% of Blacks and Hispanics graduate high school with their peers (High School Drop Outs in America: Fact Sheet, 2009). Lack of information on "drop-outs" results in incomplete reporting of depression and obesity within the population and possibly skewed data.

Application to Practice:

Current health education standards from the Joint Committee of National Health Education Standards include 14 major areas based on morbidity and mortality rates for US children and teens (Kann et al, 2007). Currently, only 5.9% of states require elementary schools to cover all 14 points, and only 1 in 5 schools require testing over at least one area (Kann et al, 2007). Within middle schools and junior highs, rates are higher in regards to covering all 14 areas, 21.6%, but testing rates still remain around 1 in 5 (Kann et al, 2007). Less than ½ of middle schools and junior highs even offer, let alone test, mental and emotional health/ suicide prevention curriculum in conjunction with physical activity and dietary intake (Kann et al, 2007). Implications of the study and the strength of the relationship between depression and obesity could be used to support changes to health education requirements at the state and district level. By mandating testing, increasing hours dedicated to health education and the number of health areas covered during those hours within the pre-high school years could decrease the

number of overweight and obese teens and the levels of severe depression (indicated by considering or planning suicide).

Conclusion:

In summary, a relationship between obesity and depression and depressive symptoms was observed. Higher instances of depressive symptoms and depression in OW/obese were statistically significant, except for rate of depressive symptoms in OW/obese freshman vs. normal weight cohort. Females were found to have higher rates of depressive symptoms and depression, which is consistent with literature findings. The high rates of depressive symptoms and depression in all adolescent cohorts indicate the need for psycho-social components in obesity prevention and wellness programs. Rates of depression within adolescent cohort were much higher that adult averages, indicating the need for earlier intervention.

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